

5053

Diag. Cht. No. 4000

Form 504

U. S. COAST AND GEODETIC SURVEY

DEPARTMENT OF COMMERCE

DESCRIPTIVE REPORT

Type of Survey HYDROGRAPHIC

23

Field No. 2 Project 20 Office No. H-5053

LOCALITY

State HAWAIIAN IS.

General locality

Locality NECKER ID. AND VICINITY

194 29

CHIEF OF PARTY

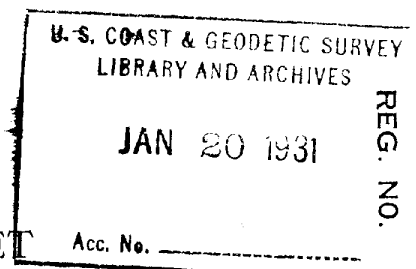
K. T. Adams

LIBRARY & ARCHIVES

DATE JANUARY 26, 1931.

5053

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY



HYDROGRAPHIC TITLE SHEET

The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

Field No. 2. Project 23

REGISTER NO. 5053

State ~~Territory of~~ Hawaiian Is.

General locality Necker Island

Locality Necker Id. and Vicinity

Scale 1:80,000 Date of survey JUNE 2 - 22nd, 1929

Vessel G U I D E

Chief of Party K. T. Adams

Surveyed by K. T. Adams

Protracted by J. C. Mathisson

Soundings penciled by J. C. Mathisson

Soundings in fathoms -feet

Plane of reference M L L W

Subdivision of wire dragged areas by _____

Inked by _____

Verified by _____

Instructions dated March 26, 1928 and April 12, 1929.

Remarks: _____

DESCRIPTIVE REPORT
to accompany
HYDROGRAPHIC SHEET NO. 2
Necker Island, T. of H.

INSTRUCTIONS: The accompanying hydrographic sheet was executed in compliance with your instructions for Project 22, dated March 26th, 1928, and for Project 33, dated April 12th, 1929.

SOUNDING METHODS: All soundings were taken with the Fathometer, read by an officer, with the exception of a few hand lead soundings on T day, which split the Fathometer work over a shoal area. In general, the red-light method was used in depths below 350 fathoms and the white light method was used in greater depths.

CONTROL METHODS: The work was controlled by three point fixes on buoys and the island; by closed loops run from one buoy to another, or from one buoy out into deep water and return to the same buoy; and by bearings and logged distances.

Practically all of the work beyond the limit of the shoal proper was controlled by closed dead reckoning loops with bearings and one angle whenever possible.

The northwestern end of the shoal proper was surveyed by dead reckoning lines run from a buoy to the island. These lines were kept with as few turns as possible.

The eastern end of the shoal proper was surveyed by dead reckoning loops run from buoy FIVE.

The remainder of the shoal proper, which includes the larger part of it, was surveyed by three point fixed positions.

LIMITS: The 1000 fathom curve was set as the outer limit of work and an effort was made to cover everything inside of that curve on this sheet.

The spacing of lines over the shoal proper was set at one-half mile. Of course it was very difficult to maintain any definite spacing in the area controlled by dead reckoning.

The spacing was expanded toward the deeper water.

The sheet makes a junction with Sheet No. 1 close to Necker Island. Where any discrepancy in soundings exists at this junction the soundings on Sheet No. 1 should be considered as more correctly controlled than those on this sheet.

This sheet joins Sheet No. 6 at its outer limit on all sides.

BOUYS: Buoys in seven different locations were used as control. Considerable trouble was encountered with these buoys at first in this vicinity. The buoys were liable to break near the barrel and either fall down or disappear altogether. I have covered the type of buoy finally successfully used in a special report.

Buoys ONE and TWO were first anchored and located by double dead reckoning runs from Necker Island and separate azimuths. These buoys were both broken and the position lost, necessitating their replacement by buoys UNO and DOS, which had to be relocated.

TRE was located by a double dead reckoning run from Necker Island; FOUR was located from TRE and FIVE from FOUR. In each case separate sun azimuths were obtained for the azimuth.

Later SIX and SEVEN were anchored and located by three point sextant fixes on the buoys to the north and the island.

TREATMENT OF CERTAIN LINES: Due to the buoys disappearing, at least two lines were left without adequate control. These lines are:

- (a) The loop 30 - 57 C. This line was started at Buoy ONE and on return it was discovered that ONE had broken and was adrift. The line was adjusted to the other hydrography by using bearings on TOP and the depth curves.
- (b) The loop 108 - 138 D. This line was started at Necker Island to be tied in to buoy TWO but buoy TWO was missing. It was continued as a loop and tied back into Necker Island. After all other soundings were plotted it was readjusted to make it fit the soundings in the vicinity of Buoy TWO.
- (c) A dead reckoning line on Sheet No. 6 was started at Buoy FIVE and part of this line forms a part of this sheet. It has been transferred from Sheet No. 6.

Where crossings occurred in the dead reckoning loops, these were sometimes adjusted to make the soundings agree, by holding the stronger lines fixed and adjusting the weaker line to it.

In some cases the slopes are so steep that it is practically impossible to make the soundings agree but they will agree within practical limits.

REDUCTION OF FATHOMETER SOUNDINGS: All redlight soundings were corrected for velocity correction and for constant index error. The

velocity correction, however, was omitted on the white light soundings in accordance with your authority dated December 12, 1929, which was based on data submitted in my letter of December 5, 1929, from which the following is quoted in part:

"I give herewith a resume' of the reductions necessary on one sheet which has already been reduced.

From zero to 200 fathoms the reductions are plus and gradually increase from zero to three fathoms.

From 200 fathoms to 450 fathoms the reductions gradually decrease from plus three fathoms to zero.

From 450 fathoms to 1500 fathoms the reductions are negative and gradually increase from zero to seven fathoms.

It is therefore to be seen that this reduction is always less than one-half of one percent and is generally very much less than that. Also, this reduction is always less than half of the probable error of observation of a whitelight sounding".

All soundings were corrected for slope, the slope being determined on a percentage basis by using a celluloid scale originally devised by Lieutenant J. A. Bond.

SHOAL SOUNDINGS: The shallowest sounding on the sheet is $8\frac{1}{4}$ fathoms three miles southwest of Buoy FOUR. This is a Fathometer sounding and nothing quite so shoal was obtained by the hand lead when splits were run later; however this immediate area is quite lumpy as will be noted by the several separate ten fathom curves.

It is not certain that the least depth was obtained in this area, although it was not considered warranting any more time spent on it at that time.

Several places on the edge of the shoal proper will be noted where the depths decrease. For instance:

- (a) 15 fathoms, 3 miles S S E of Buoy UNO.
- (b) 15 fathoms, 5 miles S E x S of Buoy UNO.
- (c) 13 fathoms, 5 miles S W x S of Necker Island.
- (d) 14 fathoms, $4\frac{1}{2}$ miles south of Necker Island.
- (e) 13 fathoms, $5\frac{1}{2}$ miles S E x S of Necker Island.
- (f) The entire periphery of the shoal from (a) above to a point 7 miles S W of Buoy SIX. Southwestern edge of the

The above shallower depths along the edge of the shoal are apparently a characteristic of such areas. A similar condition was found on the edge of the shoal west of French Frigate Shoal.

The shoal spot 3 miles S by W of Necker island was investigated on H day, June, 9, (see Sounding Volume No.2, Page 52). These depths were checked at this time by the Fathometer, although not quite so shoal soundings were obtained with the hand lead.

RECORDS: All sounding and control data were recorded in the sounding records. No separate dead reckoning book was used. Two logs were streamed at all times when doing dead reckoning work.

From the sounding records, dead reckoning plotting sheets were made up, in which all the data were reduced to media which could be used in plotting. The sounding lines were then plotted from these sheets.

All of the observed data, from which the locations of the buoys were determined, were recorded in separate volumes, which volumes form a part of the records accompanying this sheet.

DISCREPANCIES: There are a few crossing discrepancies but in general the crossings are well within the limits to be expected from Fathometer soundings and especially when in a area which was controlled by dead reckoning. Also, some trouble was being experienced with the Fathometer at this time.

PRECEDENCE OF SHEETS: Where this sheet, (No.2), makes a junction with or overlaps Sheet No. 1, Sheet No. 1 should be given the preference both as to control and depth of soundings.

However, where lines on Sheet No. 6 overlap this sheet,(No.2), this sheet is to be given the preference both as to control and as to accuracy of depths.

K.T. Adams
K. T. Adams,
H & G E,
U.S.C. & G. S.
Chief of Party

VERIFICATION REPORT
to accompany
HYDROGRAPHIC SHEET NO.2
Necker Island, T.of H.

This will certify that I have examined the completed smooth sheet and records and hereby approve same.

The actual field work was done under my direct supervision, practically all of the lines being laid out by myself and a great percentage of the actual bridge work superintended by myself.

All signals on Necker Island were transferred to this sheet from Hydrographic Sheet No. 1.

Most of the positions on this sheet, which came within the limits of Hydrographic Sheet No. 1, were plotted on the latter and transferred by DMs and DPs to the former.

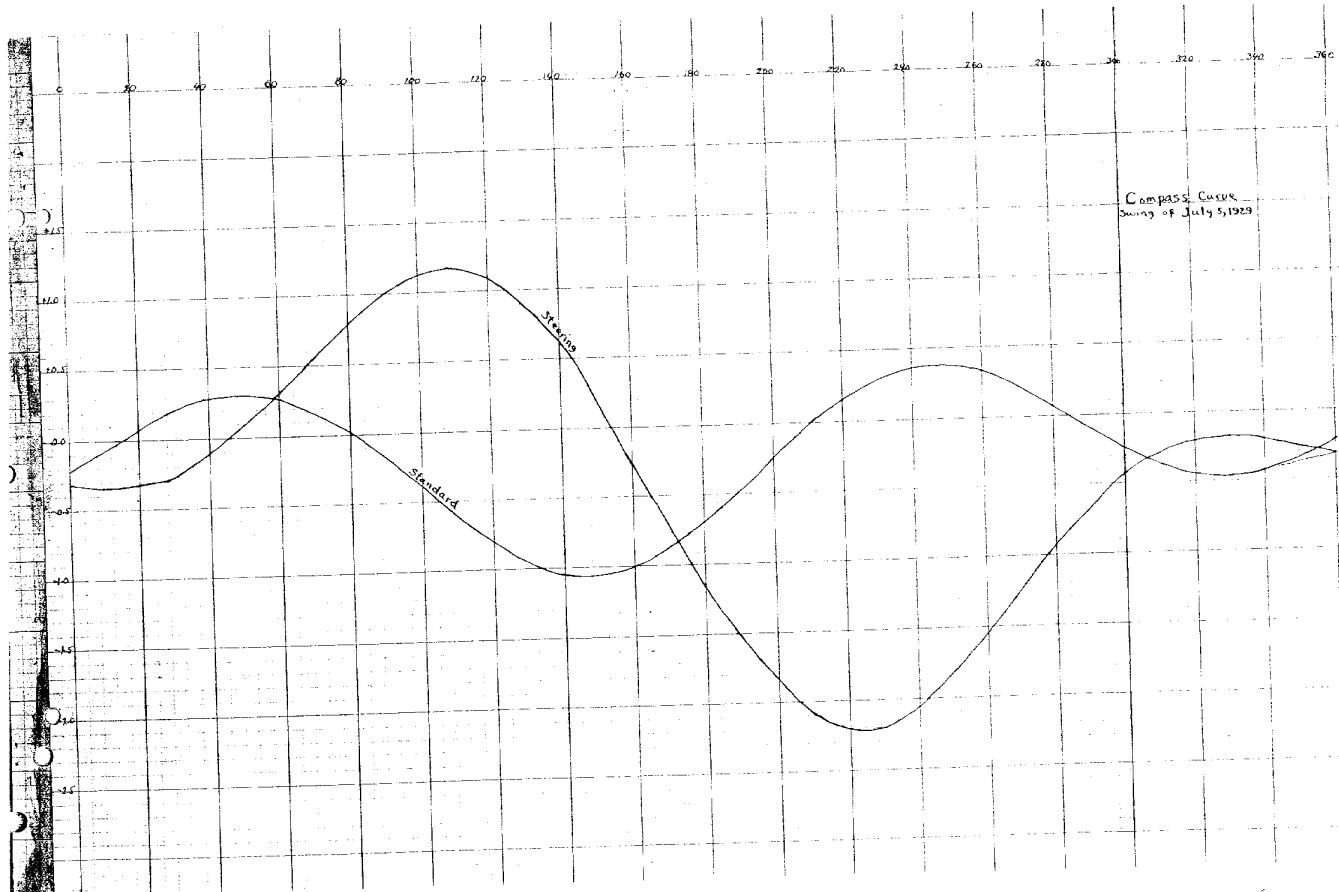
K.T. Adams
K. T. Adams,
Commanding,
Steamer GUIDE.

SHEET NO. 2.
NECKER ID., T. H.

Serial Temperature 8.5 mi. True from Necker Id.

August 14, 1929.

DEPTH	C°	
	#14-996	#4102
Surface	25.70	25.80
5	25.70	26.40
10	26.00	26.30
15	26.00	26.30
25	26.10	26.10
35	25.60	25.50
45	25.50	24.00
60 $\frac{1}{4}$	21.80	21.90
60 $\frac{1}{2}$	23.70	22.40
86	21.00	21.60
100 $\frac{1}{4}$	20.30	20.80
115 $\frac{3}{4}$	18.90	19.00
131 $\frac{1}{4}$	16.50	17.80
145 $\frac{1}{2}$	14.50	16.30
166 $\frac{1}{4}$	14.40	14.20
187	13.30	12.70
211	11.20	11.10
246	9.70 ?	MISS
246 $\frac{1}{4}$	10.70	10.50
261 $\frac{1}{2}$	9.75	9.35
286 $\frac{1}{2}$	8.00	7.70
352	6.40	
411	5.20	
601 $\frac{1}{2}$	3.80	
829 $\frac{1}{4}$ (BOTTOM)	3.00	



SHEET NO. 2.
NECKER ID.

Fathometer Comparisons

Date	Fath.		H. L.	H. L.	Fath.	
					+	-
6/2	15.0	+.4	15.4	15.7	+0.3	
6/3	15.0	+.4	15.4	15.2		-0.2
	15.0	+.4	15.4	15.0		0.4
	14.8	+.4	15.2	15.7	0.5	
6/4	14.5	+.4	14.9	15.8	0.9	
6/5	17.0	+.5	17.5	17.5		
	13.5	+.4	13.9	14.3	0.4	
6/6	14.8	+.4	15.2	15.2		+6.8
6/7	14.5	+.4	14.9	15.0	0.1	-0.6
	16.0	+.4	16.4	16.7	0.3	
6/8	15.6	+.4	16.0	16.7	0.7	20 +8.2 sum (20)
	14.8	+.4	15.2	15.5	0.3	+0.31 mean
6/9	14.6	+.4	15.0	15.6	0.6	
	18.8	+.5	19.3	20.0	0.7	
6/10	18.2	+.5	18.7	19.0	0.3	
	18.0	+.5	18.5	18.8	0.3	
6/11	17.0	+.5	17.5	18.2	0.7	
	18.5	+.5	19.0	19.2	0.2	
6/12	18.7	+.5	19.2	19.5	0.3	
	19.5	+.5	20.0	20.2	0.2	
6/13	23.0	+.6	23.6	23.7	0.1	
	17.6	+.5	18.1	18.2	0.1	
6/14	17.3	+.5	17.8	18.0	0.2	
	16.8	+.5	17.3	17.0		0.3
6/15	16.0	+.4	16.4	16.8	0.4	
	20.0	+.5	20.5	20.7	0.2	
6/16	20.0	+.5	20.5	20.0		0.5
	19.0	+.5	19.5	19.5		+1.6
6/17	19.0	+.5	19.5	19.5		-1.3
	13.8	+.4	14.2	14.3	0.1	17) +0.3 (0.018
6/18	14.5	+.4	14.9	15.0	0.1	
	18.2	+.5	18.7	19.0	0.3	
6/19	17.6	+.5	18.1	18.0		0.1
6/20	16.0	+.4	16.4	17.3	Reject, underway; no good Reject, too far from other means	
	18.9	+.5	19.4	20.5		
6/21	19.5	+.5	19.9	19.8		0.1
	21.8	+.6	22.4	22.3		0.1
6/22	21.4	+.6	22.0	21.8		0.2
	18.5	+.5	19.0	18.9	0.1	

SHEET NO. 2.
NECKER ID.

Red Light Velocity Corrections.

Depth	Temp. °C	Mean	Factor	Corr.
0	26.3	26.30	+0.0285	
52.3	26.0	26.15	+0.0282	
77.6	25.3	25.87	+0.0278	
101.2	23.6	25.30	+0.0269	
123.2	22.0	24.80	+0.0262	
144.5	21.3	24.08	+0.0252	
165.0	20.5	23.57		
184.5	19.5	23.06		
202.7	18.2	22.52	+0.0231	
219.5	16.8	21.95	+0.0209	
235.1	15.6	21.37	+0.0194	
249.7	14.6	20.81		
263.2	13.5	20.25		
275.9	12.7	19.71		
287.8	11.9	19.17		
299.1	11.3	18.69		
309.8	10.7	18.22		
319.9	10.1	17.77		
329.3	9.4	17.33		
388.0	8.7	16.90		
346.0	8.0	16.48		
353.6	7.6	16.07	+0.0096	
360.8	7.2	15.69	+0.0078	
367.7	6.9	15.32		
374.3	6.6	14.97		
380.6	6.3	14.64		
386.7	6.1	14.32	+0.0053	
392.5	5.8	14.03	+0.0056	
398.1	5.6	13.73		
403.5	5.4	13.45		

Summary Depth	Corr. in fms.
13-16.8	+0.4
16.8-20.3	+0.5
20.3-23.6	+0.6
23.6-27.6	+0.7
27.6-33.1	+0.8
33.1-35.0	+0.9
35.0-38.7	+1.0
38.7-42.7	+1.1
42.7-46.9	+1.2
46.9-51.0	+1.3
51.0-55.2	+1.4
55.2-59.3	+1.5
59.3-63.7	+1.6
63.7-67.8	+1.7
67.8-72.6	+1.8
72.6-77.4	+1.9
77.4-131	+2.0
131-300	+3.0
300-372	+2.0
372-End	+1.0

SHEET NO. 2.
NECKER ID., T. H.

Statistics

Date	Day	Hand Lead		White Light		Red Light		Total for day		Pos.
		No.	Sta. mi.	No.	Sta. Mi.	No.	Sta. Mi.	Sndgs	Sta. Mi.	
6/2	A	1		32		116	27.5	117	27.5	38
6/3	B	2		29	10.0	118	39.0	149	49.0	68
6/4	C	1		45	17.1	282	33.7	328	50.8	87
6/5	D	2		88	34.0	236	88.3	326	122.3	138
6/6	E	1				498	107.0	499	107.0	130
6/7	F	2				116	43.7	118	43.7	50
6/8	G	2		27	9.5	275	67.8	304	77.3	85
6/9	H			14	5.2	333	98.1	347	103.3	110
6/10	J			17	6.0	301	88.1	318	94.1	113
6/11	K			94	31.2	431	108.8	525	140.0	151
6/12	L			13	5.0	156	47.6	169	52.6	54
6/13	M			35	11.3	221	64.8	256	76.1	84
6/14	N			89	29.7	321	85.1	410	114.8	138
6/15	P			154	57.5	248	68.8	402	126.3	135
6/16	Q			73	19.9	371	111.4	444	131.3	143
6/17	R			67	22.9	375	109.7	442	132.6	140
6/18	S					418	130.7	418	130.7	144
6/19	T	174	16.6			86	26.3	260	42.9	87
6/20	U	51	11.4			220	68.6	271	80.0	114
6/21	V			35	8.3	483	135.1	518	143.4	148
6/22	W			62	23.0	517	128.4	579	151.4	171
TOTALS		236	28.0	842	290.6	6122	1678.5	7200	1997.1	2328

SHEET NO. 2.
NECKER ID., T. H.

Data sheet for ocean observations.

Sample No. Date Time	Latitude Longitude	Therm No. Reading Cor. Temp.	Haul No. Depth	Salinity
160 5/31/29 7:00 a.m.	23-56.0 164-11.0	23.7	Surface	35.35
161 5/31/29 11:00 a.m.	24-08.5 164-45.5	24.6	Surface	35.50
163 6/7/ 29 6:30 p.m.	23-35.2 164-42.9	24.8	Surface	35.21
164 6/8/ 29 10:50 a.m.	23-40.0 165-00.0	24.1	Surface	35.49
165 6/10/29 6:48 a.m.	23-48.8 164-38.1	23.9	Surface	35.59
166 6/11/29 7:58 a.m.	23-58.0 164-28.0	24.2	Surface	35.49
167 6/13/29 11:30 a.m.	23-42.0 164-21.0	24.5	Surface	35.41
168 6/15/29 8:36 a.m.	23-12.5 164-42.0	25.6	Surface	35.19
169 6/15/29 1:58 p.m.	23-33.6 164-11.8	25.3	Surface	35.28
170 6/16/29 10:04 a.m.	23-17.35 164-09.5	25.4	Surface	35.17
171 6/21/29 10:01 a.m.	23-11.8 164-20.8	25.6	Surface	35.09
186 8/14/29 5.46 p.m.	23-21.2 164-40.7	3.0 C	829 $\frac{1}{4}$ fms	34.96

SHEET NO. 2.
NECKER ID.

Log Data

Period	Log No.	Factor	Log No.	Factor
May 31 to July 27, 1929	194	0.9645	195	1.035

Compass Data

Period	Date of Swing Standard	Wheelhouse
May 29 to July 27, 1929	July 5, 1929	July 5, 1929

(FOR FIELD RECORDS FILES)

3

January 29, 1931

Division of Hydrography and Topography:

Division of Charts:

Tide Reducers are approved in
7 volumes of sounding records for

HYDROGRAPHIC SHEET 5053

Locality Necker Island, Territory of Hawaii

Chief of Party: K. T. Adams, in 1929

Plane of reference is mean lower low water, reading

3.5 ft. on ~~tide gauge~~ tabulations at Honolulu
17.3 ft. below B. M. 2

Condition of records satisfactory except as checked below:

1. Locality and sublocality of survey omitted.
2. Month and day of month omitted.
3. Time meridian not given at beginning of day's work.
4. Time (whether A.M. or P.M.) not given at beginning of day's work.
5. Soundings (whether in feet or fathoms) not clearly shown in record.
6. Leadline correction entered in wrong column.
7. Field reductions entered in "Office" column.
8. Location of tide gauge not given at beginning of day's work.
9. Leadline corrections not clearly stated.
10. Kind of sounding tube used not stated.
11. Sounding tube No. entered in column of "Soundings" instead of "Remarks".
12. Legibility of record could be improved.
13. Remarks.

PCW

Chief, Division of Tides and Currents.

Field Records Section (Charts)

HYDROGRAPHIC SHEET No. *H. 5053*

The following statistics will be submitted with the
cartographer's report on the sheet:

Number of positions on sheet	... <i>2328</i>
Number of positions checked	... <i>296</i>
Number of positions revised	... <i>None</i>
Number of soundings recorded	... <i>7200</i>
Number of soundings revised	... <i>37</i>
Number of signals erroneously plotted or transferred	... <i>None</i>

Date:.....*Dec. 10, 1931*.....

Cartographer:.....*John Fleming*.....

Field Records Section
Report on H-5053 - Necker I. and Vicinity.
T. Hawaii.
Surveyed in 1929.
Instructions dated March 26, 1928 - April
12, 1929.
Fathometer and Leadline

Chief of Party - K. T. Adams. Surveyed by K. T. Adams.
Protracted by J. C. Mathisson - Soundings by J. C. M.
Verified and inked by J. Fleming.

1. The records are satisfactory.
2. The plan, character and extent of the development comply with both general and specific instructions, except for the lack of bottom characteristics.
3. Sounding line crossings are satisfactory. See also "Discrepancies". (Page 4 D. R.).
4. Excepting the 1000 fathom curve, all depth curves are clearly defined.
5. Junction with H-5036 (Necker I. inshore sheet) appears satisfactory. No overlap was attempted owing to the difference in scale, (16:1).

This survey confirms the Fathometer track soundings on H-4650a.

H-5055a which surrounds this sheet was incompletely verified at this writing.

6. No further surveying is required in the area covered by this sheet.

REMARKS

7. Unusual slopes are indicated at several points and some were of such nature that it was considered inadvisable to apply any slope correction factor.

(a) The largest slope factor applied was at 19-C-Vol. 1
23° 32°.5 and was 42% corresponding to 45°+
164° 54°.0

(b) The value of the slope factor applied between 112-113-V is 6% corresponding to 19° or 20° but a computation shows a slope of 60°+ - however the application of a factor based upon the latter, would result in depths greater than those indicated by the succeeding soundings, a fact which no doubt influenced the field in applying a reduced factor. There are only a small number of such occurrences throughout the work.

(c) In general the correction methods employed by the field were accepted in the office. These methods are not, of course, based upon the recommendations contained in spec. Pub. 165 which was issued subsequent to the execution of this work.

8. The numerous shoal soundings along the 20 fathom curve on the S. W. side of this formation seem to indicate the existence of a coral fringe. ~~It was decided to emphasize these soundings with broken depth curves.~~
9. It appears quite likely that shoaler depths than the $8\frac{1}{4}$ fathoms obtained, exist in the area around $23^{\circ}-25'$ — $164^{\circ}-27'.5$
*
10. The entire work is considered excellent.

Respectfully submitted,

John Fleming.

December 10, 1931.

* No development was made of the typical shoaling just inside of the edge of the reef. It is not believed, however, that any menacing shoals exist, and no additional work is recommended.

Note:

The survey covers approximately 1600 square miles but, with the exception of the area noted in par. 9 (15 sq. mi.), there are no bottom characteristics on the sheet. As this is probably the only survey that will ever be made in this locality the omission is regrettable.

Inspected - E. P. Ellis.

Applied to Chart 4181 July 27, 1940 J.H.S.